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WHAT IS PHYSALIS VARIOVESTITA?

MARGARET Y. MENZEL

In a recent revision of *Physalis* in its United States range, Waterfall (1958) has treated most of the perennial forms with stellate pubescence, including *P. mollis* Nutt. and its varieties, as infraspecific taxa within *P. viscosa* L.[1] This treatment agrees in general with genetic and cytological relationships insofar as they are known (Menzel, 1951, 1957, and unpublished). In regard to this group, Waterfall has retained as a separate species *P. angustifolia* Nutt., which ranges along the northern coast of the Gulf of Mexico, and has distinguished in the Texas population a previously undescribed species, *P. variovestita* Waterfall. The relationships of *P. angustifolia* to *P. viscosa* (*sensu* Rydberg, 1896) have been under study by this investigator (Menzel, 1957) and will be discussed further elsewhere. The purpose of the present note is to record some observations which may bear upon the origin and relationships of *P. variovestita*.

Waterfall's concept of *Physalis variovestita* encompasses plants which are similar to *P. viscosa* ssp. *mollis* (comprising two varieties) but which differ in having abundant long jointed hairs, the hairs simple or branched, in addition to the short, dense, stellate pubescence characteristic of *P. viscosa* ssp. *mollis*. Apparently, it is based upon a single collection. Two collections, from two counties in Texas, are cited in relation to *P. variovestita* as having vestiture approaching the type. Nineteen collections, from fifteen counties in Texas,

[1]As treated by Waterfall, *P. viscosa sens. lat.* comprises (exclusive of formae) (1) ssp. *viscosa;* (2) ssp. *maritima*, including var. *maritima*, var. *elliottii*, and var. *spathulaefolia;* (3) ssp. *mollis* with var. *mollis* and var. *cinerascens*.

are cited as "more widely diverging from *P. variovestita*, but with several to few long jointed trichomes present in addition to the short stellate hairs. . .". Waterfall remarks that the existence of a population (?) of *P. variovestita* could perhaps have been predicted on the basis of the intergrades with *P. viscosa* ssp. *mollis* by Anderson's (1949) method of extrapolated correlates.

Observations of the present investigator indicate that there also exists in Texas (and perhaps as far north as Illinois and Indiana) a rare form of *Physalis*, related in a general way to *P. virginiana* Miller, characterized by a very large (to 4-5 cm. broad), pyramidal, many-ribbed but scarcely angled, fruiting calyx, deeply sunken at the base so that the small fruit is suspended in the middle of the greatly inflated calyx. All of the specimens of this form which I have seen with mature fruit had relatively very large seeds (3-4 mm. in diameter), thereby differing from all other perennial *Physalis* species known to me, in which the seed diameter seldom exceeds 2 mm. *A. A. Heller 1756* (UC, NY) is a representative specimen except that the plants are often somewhat hairier, especially on the new growth, the lower part of the stem, and the calyx. Rydberg (1895) cited this collection from Kerr County, Texas in his description of *P. macrophysa* Rydberg. Waterfall has designated one of the NY sheets as lectotype for *P. virginiana* f. *macrophysa* (Rydb.) Waterfall.

In 1950-52, my husband and I made frequent excursions in company with Dr. H. B. Parks to various parts of Brazos County, Texas in order to become acquainted with the local flora, with which Dr. Parks was intimately familiar. In the course of these field trips, observations were made on *Physalis*, and we found forms resembling what is now called *P. variovestita* common in weedy sites in many parts of the County, usually growing intermingled with forms identifiable with *P. mollis* and indistinguishable from the latter except in vestiture. In a few extreme clones, the short stellate pubescence of *P. mollis* was almost entirely replaced by simple and partly glandular hairs.

Having learned of my interest in *P. macrophysa* and in variations in *P. mollis*, Dr. Parks guided me to two remote sites near the Navasota River, known locally as Long Cross-

ing and Democrat Crossing, where interesting *Physalis* populations occurred.

At Long Crossing, about 5 miles east of Curtin and about 3 miles west of the first of a series of bridges across the swamps of the Navasota River, the (nearly impassable) road had been cut through the crest of a hill, the eastern slope of which led down to the river bottom. The cut had exposed a stratum of red clay for a distance of about 15 feet. In the exposed clay was a single clone, comprising several shoots, of *P. macrophysa*. Along the roadside in both directions, and in open woods on either side of the road, in an area about half a mile in radius, was a large population of plants with characters intergrading between *P. mollis* and *P. macrophysa*. In the intergrades, the indument varied from entirely short and stellate to nearly all long and jointed, with various intermediate combinations; seed size ranged from about 1.8 to about 3.5 mm. in diameter; and there was much variation in size and shape of the fruiting calyx. Plants of the *P. macrophysa* clone had rather large campanulate flowers with five large brown spots, reminiscent of *P. virginiana* and some forms of *P. heterophylla* Nees; the flower buds were lanceolate with the calyx lobes exceeding the corolla by 2-3 mm. In *P. mollis* the flowers are usually smaller, more rotate, and purple- or black-spotted, and the buds are ovate, the calyx lobes scarcely exceeding the corolla. The flower characters of *P. macrophysa* appeared occasionally in the intergrades.

At Democrat Crossing a somewhat similar population occurred except that no clone corresponding exactly to *P. macrophysa* was found. Two clones approached it closely, having seeds 3-3.5 mm. in diameter, large fruiting calyces, and lanceolate buds; the pubescence was dense but composed entirely of simple hairs.[2] One had brown corolla spots, the

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[2]It may be noted that these clones, if isolated as dried specimens from the population in which they occurred, would pass for a rather atypical form of *P. heterophylla*, similar to that noted previously from near Austin, Travis County, Texas (Menzel, 1951, p. 165). Representative specimens are (TEX): *Cohn and Barkley* 13177; *Ferguson* April 20, 1901; *Tharp* April 16, 1927; April 20, 1927; May 5, 1930; *M. S. Young* May 6, 1917; May 12, 1918. Since *P. mollis* is common in Travis County, and *P. macrophysa* has also been collected there (*Tharp* May 6, 1931, TEX, also cited by Waterfall), it seems likely that a population of intergrades between *P. mollis* and *P. macrophysa* may exist in this area.

other purple spots. These two clones appeared to be growing on sandy loam in open woods, but a little work with a shovel revealed that their rootstocks were located about six feet below in red clay. This observation is interesting in view of Dr. Parks' impression that *P. macrophysa* occurs only on "Crockett red clay".

It may be added that at both the above locations, as well as elsewhere in Brazos County, the vast majority of intergrades had many more characters in common with *P. mollis* than with *P. macrophysa*. That is to say, they had characteristics varying between *P. variovestita*, as described, and *P. mollis*, with only a few clones having characteristics between *P. variovestita* and *P. macrophysa*. This is scarcely surprising if one assumes a hybrid origin. Since *P. mollis* is common and *P. macrophysa* very rare, backcrosses to *P. mollis* would necessarily be much more frequent unless some special barrier to crossing intervened.

Attempts to transplant pieces of underground stems from the *P. macrophysa* clone and the *P. macrophysa*-like clones from Democrat Crossing to the garden in College Station, Texas, were unsuccessful. A few seeds collected from *P. macrophysa* in 1951 germinated, but the seedlings soon died. On the other hand, no difficulty was experienced in establishing the more *P. mollis*-like intergrades in the garden; indeed, two such clones occurred there naturally as a well established weed, along with several clones of typical *P. mollis*. In 1951, a freshly opened flower was collected from the *P. macrophysa* clone and used to pollinate ten emasculated flowers of one of the "dooryard" clones of *P. mollis*. Three fruits, containing a total of about 15 plump seeds, matured. The seeds, together with a set of herbarium specimens illustrating the intergradation between *P. mollis* and *P. macrophysa*, unfortunately were lost during the vicissitudes of moving from Texas to Florida.

No cytological analysis of *P. macrophysa* was obtained. Metaphase I in eight clones of the intergrades showed that all of the chromosomes were paired, but that the population was highly heterozygous for chromosome interchanges, in

this respect resembling *P. alkekengi* L. (Gottschalk, 1954) and the *P. viscosa-angustifolia* complex in Florida (Menzel, 1957). One of the *P. macrophysa*-like intergrades from Democrat Crossing showed maximum chromosome association of four bivalents and two rings of eight ($2n=24$), the highest heterozygosity for interchanges so far recorded in *Physalis*.

The information available suggests to the present author that there once existed in Texas a rather extensive population of *P. macrophysa* which has now been nearly swamped by the more aggressive *P. mollis*, but whose former range is adumbrated by variability imposed upon *P. mollis* by introgression of *P. macrophysa* genes.

These preliminary observations are reported here in the hope that they may stimulate someone closer to the scene to undertake a further study of the problem in the field.

The author wishes to thank Dr. R. K. Godfrey for helpful criticism during preparation of the manuscript. — DEPARTMENT OF BIOLOGICAL SCIENCES, FLORIDA STATE UNIVERSITY, TALLAHASSEE, FLORIDA.

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CHROMOSOME NUMBERS IN THE COMPOSITAE II. MEIOTIC COUNTS FOR FOURTEEN SPECIES OF BRAZILIAN COMPOSITAE[1]

B. L. Turner and H. S. Irwin

The junior author of this paper spent 5 months during 1958-59 in south-central Brazil collecting *Cassia* material in connection with a doctoral thesis problem. Since he was routinely collecting bud material of various species of this genus and shipping these air mail to the senior author for meiotic examination, he was able to include, as time and opportunity permitted, occasional bud collections of the family Compositae. The present contribution summarizes the results of a study of this latter material.

METHODS

Chromosome counts were made from pollen mother cell squashes. Buds were collected from plants growing in the field and placed in a freshly mixed solution of 4 parts chloroform; 3 parts absolute alcohol; 1 part glacial acetic acid and allowed to remain for a period varying from several hours to several weeks. All collections were sent air mail from Brazil to Texas where the young anthers were subsequently removed and squashed in acetocarmine. Camera lucida drawings were made at an initial magnification of ca. 2,000 diameters. Voucher specimens (Table 1) are deposited in the University of Texas Herbarium.

OBSERVATIONS

Eupatorieae — The count for *Adenostemma brasilianum* (n=5) is the lowest so far reported for the tribe Eupatorieae. Mangenot *et al.*, (1957), reported an African species of this genus as $2n$=20. Apparently the basic number of the genus is x=5.

Eupatorium is a large genus with perhaps 400-500 species, widely distributed in the tropical and subtropical regions of the world with relatively few species extending into temperate regions. The two counts reported in the present paper are both in accord with the basic number, x=10. *E. kleinioides* (n=20) is apparently a tetraploid; however its meio-

[1] This study was supported by National Science Foundation Grant G 9025.

tic configurations, as shown in figure 1, are exceptional in that both asynaptic and paired chromosomes are seen at metaphase I. Paired chromosomes (bivalents), as determined by observations of a number of cells, varied from 4 to 7. Occasional trivalent associations were also seen. Apomixis has been suspected for other polyploid species of *Eupatorium* (Turner and Ellison, 1960; Turner and Beaman, unpubl.), but in such cases meiotic chromosomes have been completely asynaptic. It is possible that *E. kleinioides* is part of an apomictic complex such as exists in the species, *Bouteloua curtipendula* (Harlan, 1949).

Astereae — *Baccharis* is a large, predominantly woody, genus with approximately 600 species widely distributed in the tropical and subtropical regions of the New World (Luis, 1958). Including the present reports, 9 species have been counted (Darlington and Wylie, 1956); all have been diploid with $2n=18$.

Although no certain count could be obtained for *Erigeron maximus* ($n=40\pm4$) it seems significant to report this number, the highest count reported for the approximately 25 species so far investigated. *E. maximus* is the single species of the section Leptostelma and probably has the largest plants of any species in the genus; field notes on the voucher collection reads as follows: "Stout [perennial] herb to 2½ meters." According to label data on another Brazilian collection (*Y. Mexia 4341*, TEX) the species, in certain habitats, reaches 4 meters in height.

Heliantheae — *Acanthospermum australe* ($n=11$) is a weedy species of wide distribution. Carlquist (1954) reported meiotic counts from Hawaiian collections as $n = 10$. Metaphase plates, from which the present counts were made, were particularly clear (figure 3).

Chromosome counts for *Ambrosia* ($n = 18$) and *Cosmos* ($n=24$) are consistent with those reported for other species in these genera (Wagner & Beals, 1958; Darlington & Wylie, 1956).

Chromosome counts for the closely related taxa *Wedelia* and *Wulffia* are first reports for these genera. Both belong to the subtribe Verbesininae whose genera have been characterized by high basic chromosome numbers. However, in

FIGS. 1-8. Camera lucida drawings of meiotic chromosomes, all approximately X 1800. Fig. 1. *Eupatorium kleinioides* ($n = 20$; 7II, 26I). Fig. 2. *Baccharis melastomifolia* ($n = 9$; anaphase of second division). Fig. 3. *Acanthospermum australe* ($n = 11$). Fig. 4. *Ambrosia polystachya* ($n = 18$). Fig. 5. *Cosmos caudatus* ($n = 24$). Fig. 6. *Wedelia* sp. ($n = 20$). Fig. 7. *Wulffia baccata* ($n = 30 \pm 1$). Fig. 8. *Emilia coccinea* ($n = 5$).

view of the numbers listed for *Wedelia* (Table 1), it appears likely that both *Wedelia* and *Wulffia* have the basic number, $x = 10$.

Senecionieae — Baldwin (1946) reported that individuals in five populations of *Emilia coccinea* in the Amazon Valley and one from southern Florida had $2n = 20$. The present count for this species, $n = 5$, is based on material collected at Belo Horizonte in South-central Brazil. Although further study is required, it would appear that two chromosome races of *E. coccinea* exist, diploid and tetraploid. It would be of considerable interest to determine if both races have been introduced from the Old World, or whether one has arisen in the New.

Cooper (1936) reported *Erechtites hieracifolia* to have a count of $2n = 40$, this being interpreted by Darlington and Wylie (1956) as indicative of a basic number $x = 10$ for the genus. The present count of $n = 20$ for *E. valerianaefolia* is in accord with Cooper's report.

TABLE 1. SPECIES OF COMPOSITAE EXAMINED FOR CHROMOSOME NUMBERS

Species	Plant Source and Voucher collection	Chromosome Number
EUPATORIEAE	BRAZIL	
Adenostemma brasilianum Cass.	Minas Gerais. *H. S. Irwin* : *2700*	$n = 5$
Eupatorium kleinioides H. B. K.	Goiás. *Irwin 2573.*	$n = 20$ (7 II, 26 I)
Eupatorium ligulifolium H. & A.	Minas Gerais. *Irwin 2408.*	$n = 10$
ASTEREAE		
Baccharis melastomifolia H. & A.	Minas Gerais. *Irwin 2258.*	$n = 9$
Baccharis melastomifolia H. & A.	Minas Gerais. *Irwin 2072.*	$2n = 18$
Baccharis trinervis Pers.	Minas Gerais. *Irwin 2648.*	$n = 9$
Erigeron maximus Link & Otto	Minas Gerais. *Irwin 2181.*	$n = 40 \pm 4$
HELIANTHEAE		
Acanthospermum australe (Loefl.) Ktze.	Minas Gerais. *Irwin 2138.*	$n = 11$
Ambrosia polystachya DC.	Minas Gerais. *Irwin 2125.*	$n = 18$
Cosmos caudatus H.B.K.	Minas Gerais. *Irwin 2214.*	$n = 24$
Wedelia sp.	Goiás. *Irwin 2541.*	$n = 20$
Wedelia brasiliensis (Spreng.) Blake	Minas Gerais. *Irwin 2185.*	$n = 29 \pm 1$
Wulffia baccata (L.f.) Ktze.	Minas Gerais. *Irwin 2277.*	$n = 30 \pm 1$
SENECIONIEAE		
Emilia coccinea (Sims) Sweet	Minas Gerais. *Irwin 2337.*	$n = 5$
Erechtites valerianaefolia (Wolf.) DC.	Minas Gerais. *Irwin 2066.*	$n = 20$

SUMMARY

Meiotic chromosome counts are reported for 14 collections of Brazilian Compositae. These include first reports for 13 species and 2 new generic reports (*Wedelia* and *Wulffia*). The highest count yet found for a species of *Erigeron* (*E. maximus*, $n = 40 \pm 4$) is reported. In addition, a count of $n = 11$ for *Acanthospermum australe* was found not to agree with the count of $n = 10$ reported for this weedy species from the Hawaiian Islands. — BOTANY DEPARTMENT, UNIVERSITY OF TEXAS, AUSTIN.

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THE STATUS OF LINDLEY'S AESCULUS NEGLECTA

JAMES W. HARDIN

The shrubby, yellow-flowered buckeye found in the Piedmont of eastern United States has a rather long list of synonyms, but in general it is known as either *Aesculus sylvatica* Bartram or *A. neglecta* Lindley. Deciding which of these names to use has, up until now, involved the controversy over the validity of Bartram's names. In the revision of the American Hippocastanaceae (Brittonia 9:145-171, 173-195. 1957) I decided to accept *A. sylvatica* Bartr. as valid and relegate *A. neglecta* Lindl. to synonymy.

The holotype of *A. neglecta* is in the Botany School Herbarium, University of Cambridge, Cambridge, England. Lindley, in the original description (Edwards Botanical Register 12:1009. 1826), stated that the name was based on a plant purchased by the London Horticultural Society from Monsieur Catros of Bourdeaux. This tree was planted in the garden which was at Chiswick, now part of London. The specimen, labeled as the holotype, has on it "Hort. H. S. 1826" meaning Garden (Hortus) of the Horticultural Society, purchased in 1826. Also on the sheet in script is "*Aesculus neglecta* Nob., May 1826." This specimen also appears to be the one used to make the drawing for t. 1009 of the Botanical Register, which accompanies the original description. I am indebted to Dr. Peter F. Yeo, of the University Botanic Garden, Cambridge, for verifying the validity of this specimen as the holotype and bringing it to my attention in the first place.

Lindley's description fits what we know as *A. sylvatica* with the possible exception of his statements that the calyx is "clothed with black, glandular hairs" and the fact that the specimen was "a handsome hardy small tree." Since, on occasion, *A. sylvatica* is found as a small tree, and sometimes may have small stipitate glands on the calyx, these statements did not arouse very much suspicion when the description was studied. One question of its true nature did arise since Koehne (Deutsche Dendr. 386. 1893) suggested that Lindley's *A. neglecta* was a hybrid between *A. discolor* and *octandra*. Since neither the description nor the illustration indicated characteristics of *discolor* (= *pavia*) this possibility was dismissed.

A recent examination of the holotype of *A. neglecta* revealed the fact that the stipitate glands on the calyx and throughout the pedicel are long and black — a diagnostic feature of *A. octandra*. Also the general aspect of the leaf, in this holotype, approaches that of *A. octandra*. This type specimen is identical to specimens collected by me and identified as *A. octandra* X *sylvatica*, a result of natural hybridization, or introgression, between the two species. The specimen showed no characteristics of *A. pavia*.

The exact origin of this type tree is unknown, but it is possible that either the seed came from an area in Georgia or South Carolina where such hybrids frequently occur, or that the hybrid arose in a garden of Europe, an event that has occurred frequently.

Since Lindley's *A. neglecta* is based on a hybrid between *A. octandra* and *A. sylvatica*, his name must be removed from its place as a synonym of *A. sylvatica* and now be placed in synonymy under the hybrid formula along with *A. glaucescens* Sarg. (see Rhodora 59:193. 1957). If, on the other hand, a specific epithet is used for this hybrid, then *A.* x *neglecta* (pro. sp.) has priority over *A.* x *glaucescens* (pro. sp.). This would be especially confusing since *A. neglecta* is already well established in the literature for what we call *A. sylvatica*. I have already expressed the view (Brittonia, 1. c.) that formulae instead of specific epithets are better for designating the hybrids and various recombinants encountered in *Aesculus*.

The question that naturally arises at this point is whether or not William Bartram saw the true species or a hybrid form when he described *A. sylvatica*. The disturbing fact is that the areas in which he found this species are ones where hybrids between *sylvatica* and *octandra* or between *sylvatica* and *pavia* are frequently found today. The original description ("floribus ex albo et carneo eleganter variegatis, caule arboreo") is too incomplete to answer this question, and no type is known.

In Bartram's "Travels" (1791) he mentioned finding *A. sylvatica* in the Piedmont of Georgia and the Carolinas. His description, however, is based on a plant found at Ashwood, on the west side of the Cape Fear River, 5 miles northeast of

Council, in Bladen County, North Carolina. This locality is on the Coastal Plain, distinctly east of both the Piedmont and the present distribution of *A. sylvatica*. Bartram mentioned that *A. pavia* was also at Ashwood, and the more recent collections that I have seen from that area are *A. pavia*, *pavia* X *sylvatica* and *sylvatica* (X *pavia*). Many of these last hybrids very nearly approach *A. sylvatica* but have a few characteristics of *A. pavia*. There are two possibilities for the occurrence of this strong element of *A. sylvatica* in this area. First, it is entirely possible that *A. sylvatica* did extend into the Coastal Plain along the bluffs of the Cape Fear River during the time of Bartram's expeditions and has only more recently been limited to the Piedmont. Second, there is the possibility that this plant was not native in that area at all, but had been brought at an early date from the Piedmont and planted there at Ashwood by Colonel Bartram, William's uncle. If the latter is true, then this introduced plant(s) could have hybridized with the native *A. pavia* in the area which would account for the hybrids found there now. In any case, lacking evidence to the contrary, we must assume that Bartram's description was based on *A. sylvatica* and not on a hybrid form.

The British Museum has no specimen of this species collected by Bartram, and further attempts to find the type material have failed. Since, to my knowledge, no types or original material of *A. sylvatica* are in existence, I am therefore designating a *neotype*: Hardin No. 113, 22 April 1953, Union Co., South Carolina. This specimen is preserved in the Herbarium, Department of Botany, North Carolina State College.

In summary, the synonymy now must stand as follows:

1. *Aesculus sylvatica* Bartram, Travels 476. 1791.
   A. neglecta of many authors, not Lindl.
2. *Aesculus octandra* X *sylvatica*
   A. x *neglecta* Lindl. (pro. sp.), in Edwards Bot. Reg. 12:1009. 1826.
   A. x *glaucescens* Sarg. (pro. sp.), Trees & Shrubs 2:257. 1913.

DEPARTMENT OF BOTANY, NORTH CAROLINA STATE COLLEGE, RALEIGH.

NEW COMBINATIONS AND FORMS IN THE MISSOURI FLORA[1]

JULIAN A. STEYERMARK

During the course of preparation of a *Flora of Missouri*, the author has found it necessary to make a number of new combinations. In the present paper only the essential bibliography is given. The reasons for assigning the names to their new status are given in the forthcoming *Flora* or in separate papers.

Trillium pusillum Michx. var. **ozarkanum** (Palmer & Steyerm.) Steyerm., comb. nov. Based on *Trillium ozarkanum* Palmer & Steyerm., Ann. Mo. Bot. Gard. **22**: 504. 1935.

Salix rigida Muhl. var. **rigida** f. **subintegra** (Palmer & Steyerm.) Steyerm., comb. nov. Based on *Salix cordata* Muhl. f. *subintegra* Palmer & Steyerm. in Ann. Mo. Bot. Gard. **25**: 770. 1938.

Carya ovata (Mill.) K. Koch f. **Nuttallii** (Sarg.) Steyerm., comb. nov. Based on *Carya ovata* var. *Nuttallii* Sarg. Trees and Shrubs **2**: 207. 1913.

Carya ovata (Mill.) K. Koch f. **ellipsoidalis** (Sarg.) Steyerm., comb. nov. Based on *Carya ovata* var. *ellipsoidalis* Sarg. Bot. Gaz. 66: 235. 1918.

Carya ovata (Mill.) K. Koch f. **fraxinifolia** (Sarg.) Steyerm., comb. nov. Based on *Carya ovata* var. *fraxinifolia* Sarg. Trees and Shrubs **2**: 207. 1913.

Carya texana Buckl. var. **texana** f. **glabra** (Palmer & Steyerm.) Steyerm., comb. nov. Based on *Carya Buckleyi* Sarg. var. *arkansana* Sarg. f. *glabra* Palmer & Steyerm., Ann. Mo. Bot. Gard. **25**: 770. 1938.

Quercus prinoides Willd. var. **acuminata** (Michx.) Gl. f. **Alexanderi** (Britt.) Steyerm., comb. nov. Based on *Quercus Alexanderi* Britton, Man. Fl. North. States Canada. 336. 1901.

Polygonum virginianum L. var. **glaberrimum** (Fern.) Steyerm., comb. nov. Based on *Tovara virginiana* (L.) Raf. var. *glaberrima* Fern. Rhodora **39**: 404. 1937.

Arabis Shortii (Fern.) Gleason var. **phalacrocarpa** (M. Hopkins) Steyerm., comb. nov. Based on *Arabis dentata* (Torr.) T. & G. var. *phalacrocarpa* M. Hopkins, Rhodora **39**: 169. 1937.

Rubus flagellaris Willd. var. **occidualis** Bailey f. **roseo-plenus** (Palmer & Steyerm.) Steyerm., comb. nov. Based on *Rubus flagellaris* f. *roseo-plenus* Palmer & Steyerm. Brittonia **10**: 114. 1958.

Rubus flagellaris Willd. var. **occidualis** Bailey f. **roseus** Steyerm., f. nov. A forma *roseo-plenus* petalis plerumque quinque roseis differt. — Along low woods in valley of creek tributary to Castor River, T 29 N, R 8 E, sec. 5, 3¾ mi. northwest of Buchanan P. O., Bollinger Co., **May 8, 1957, *Steyermark 84212*, HOLOTYPE**, in Univ. Mo. Herb.

[1] Work on this paper was completed during the period when the author received grants-in-aid (G 5623, 7117) from the National Science Foundation.

Hypericum punctatum L. var. **pseudomaculatum** (Bush) Fern. f. **flavidum** Steyerm., comb. nov. Based on *Hypericum pseudomaculatum* Bush f. *flavidum* Steyerm. Rhodora **41**: 585. 1939.

Rhododendron roseum (Loisel.) Rehd. f. **albidum** Steyerm., f. nov. A forma *roseum* corollis albidis differt. — Sandy pine-oak woods east of Chimney Rocks, along River Aux Vases, 5 miles east of Pickle, Ste. Genevieve Co., May 24, 1933, *Steyermark 8522*, HOLOTYPE, in Univ. Mo. Herb., ISOTYPE in Herb. Mo. Bot. Gard.

Diospyros virginiana L. var. **pubescens** (Pursh) Dippel f. **pumila** (Palmer & Steyerm.) Steyerm., comb. nov. Based on *Diospyros virginiana* L. f. *pumila* Palmer & Steyerm. Ann. Mo. Bot. Gard. **22**: 616. 1935.

Mertensia virginica (L.) Pers. f. **rosea** Steyerm., f. nov. A forma *virginica* corollis semper roseis recedit. — Rich alluvial woods along north side of Big Creek, T 46 N, R 30 W, sec. 35, 4 mi. southeast of Pleasant Hill, Cass Co., April 17, 1949, *Steyermark 67235*, HOLOTYPE, in Herb. Chi. Nat. Hist. Mus.

In this form, which I have had growing in my wild flower garden for ten years, the corollas are deep pink from bud stage to the end of anthesis, never turning bluish as in typical f. *virginica*.

Physalis longifolia Nutt. var. **hispida** (Waterfall) Steyerm., comb. nov. Based on *Physalis virginiana* var. *hispida* Waterfall, Rhodora **60**: 154-156. 1958

Physalis longifolia Nutt. var. **subglabrata** (Mackenz. & Bush) Steyerm. comb. nov. Based on *Physalis subglabrata* Mackenz. & Bush, Trans. Acad. St. Louis **12**: 86-87. 1902.

Physalis longifolia Nutt. var. **subglabrata** (Mackenz. & Bush) Steyerm. f. **macrophysa** (Rydb.) Steyerm., comb. nov. Based on *Physalis macrophysa* Rydb., Bull. Torrey Club **22**: 308. 1895.

Gerardia flava L. var. **calycosa** (Mackenz. & Bush) Steyerm., comb. nov. Based on *Dasystoma calycosa* Mackenz. & Bush, Rept. Mo. Bot. Gard. **16**: 105. 1905.

Ruellia humilis Nutt. var. **longifolia** (Gray) Fern. f. **alba** (Steyerm.) Steyerm., comb. nov. Based on *Ruellia caroliniensis* (Walt.) Steud. f. *alba* Steyerm. Rhodora **41**: 585. 1939.

Specularia perfoliata (L.) A. DC. f. **alba** (Voigt) Steyerm., comb. nov. Based on *Triodanis* (misspelled Triodanus) *perfoliata* (L.) Nieuwl. f. *alba* Voigt, Fl. S. Ill. 325. 1959.

Solidago arguta Ait. var. **strigosa** (Small) Steyerm., comb. nov. Based on *Solidago strigosa* Small, Fl. Se. U. S. 1198, 1339. 1903.

Solidago arguta Ait. var. **neurolepis** (Fern.) Steyerm., comb. nov. Based on *Solidago neurolepis* Fern. Rhodora **38**: 212-213. 1936.

Antennaria neglecta Greene var. **campestris** (Rydb.) Steyerm., comb. nov. Based on *Antennaria campestris* Rydb. Bull. Torrey Club **24**: 304. 1897.

Heliopsis helianthoides (L.) Sweet var. **occidentalis** (Fisher) Steyerm., comb. nov. Based on *Heliopsis helianthoides* subsp. *occidentalis* Fisher, Ohio Jour. Sci. **57**: 189. 1957.

Helianthus annuus L. var. **lenticularis** (Dougl.) Steyerm., comb. nov. Based on *Helianthus lenticularis* Dougl. in Bot. Reg. *t. 1265.* 1829.

INSTITUTO BOTANICO DEL MINISTERIO DE AGRICULTURA Y CRIA, CARACAS, VENEZUELA.

A MONUMENTAL WORK IS CONCLUDED.[1] — The appearance of Volume Four of the Illustrated Flora of the Pacific States brings to a close a project started over forty years ago by the late Professor LeRoy Abrams. Planned originally in three volumes, this four-volume work in many ways mirrors some of the growth and change in systematic botany during the period. The first volume, published in 1925, was patterned after "An Illustrated Flora of the Northern United States, Canada and the British Possessions" by Britton and Brown. It also followed that work in the use of the "American Code" to govern nomenclatural matters. But four years before volume two was issued in 1944, volume one was corrected to reflect adherence to the "International Rules" and was reissued.

Although it would appear from the publication dates of the last three volumes that these were largely the work of an emeritus professor (Abrams retired in 1940), such is not the case. In the first place, Professor Abrams was actively at work on this Flora from 1910 or thereabouts until 1948, when he became incapacitated by a heart ailment. Secondly, the whole work was not planned to be the product of one man. From the beginning, there were collaborators who contributed the treatments for families or parts of families, genera, etc. This system of obtaining manuscript and sometimes illustrations from specialists was followed throughout the entire work. However, there was one collaborator on the first volume whose role increased in importance as each successive volume appeared, until in the final volume, in the absence of Professor Abrams, she "saw it through" as author. I speak, of course, of Roxana S. Ferris. Mrs. Ferris' whole botanical career has been closely linked to the "Illustrated Flora". In the second volume, she picked up the loose ends and labored with technical matters of all sorts. Then, as Professor Abrams' health failed, she gradually moved into

[1] Illustrated Flora of the Pacific States: Washington, Oregon and California. Volume IV — Bignoniaceae to Compositae, by Roxana Stinchfield Ferris. 1-732. Stanford University Press, Stanford, California. 1960. $17.50.

the gap created by his absence and brought volume three to completion. Finally, with the solid support of Professor Ira L. Wiggins and the rest of the Dudley Herbarium staff, she alone brought together volume four.

As in the other volumes, an important feature of number four has been the participation of outside specialists. The late Dr. S. F. Blake had planned to do the Compositae and, though he was ultimately unable to do so, his influence was transmitted to parts of the volume through notes he supplied and through his supervision of some drawings made by his wife, Doris Holmes Blake. By far the largest number of drawings was made especially for these volumes by Jeanne Russell Janis, whose trademark J has become familiar because of the large number of illustrations she has produced over the years. Her craftsmanship is excellent and the illustrations of the present volume reflect that excellence.

It is not my present purpose to attempt an evaluation of the taxonomic treatments of the various groups covered in volume four. Such an evaluation will really come with the repeated usage of the book against the plants growing in the area covered by it, not from the reviewer's armchair. What I can say is that the book is well printed, well constructed and presents a fine appearance. In the appendix is found a key to the families treated in all four volumes. The user, then, if he does not know the family of the plant he is trying to identify, will reach for volume four to find his guide. Pages 625-652 are an index to common names and pages 653-723 are an index to scientific names; in both indices, all four volumes are included.

Too many large botanical works are never completed. This is understandable when one fully comprehends the enormous amount of effort required. The accomplishment is usually worth the effort but the frequent failures make even more significant those major undertakings that are finally brought to full fruition. In the case of the Illustrated Flora of the Pacific States, nearly two botanical lifetimes, that of LeRoy Abrams and a large part of that of Roxana Ferris, have been devoted to its production. It is a major work and Mrs. Ferris deserves a major salute for finally bringing it to completion — Reed C. Rollins, Gray Herbarium of Harvard University.

TYPIFICATION OF EUPHORBIA MACULATA

LOUIS CUTTER WHEELER

The typification of *Euphorbia maculata* Linnaeus (1753) by the specimen in Linnaeus' Herbarium by Wheeler (1939) has occasioned some discussion both published and unpublished as it changed the sense in which this binomial had been used for perhaps a century. Since it has been two decades since this typification was published, and over a decade since commencement of published discussion, and six years since the publication of the last paper which has come to my attention, a reply to these animadversions can scarcely be considered hasty. Also, having had the opportunity to examine in 1954 the specimens in the Linnaean Herbarium and having discussed the matter with Mr. J. E. Dandy, now Keeper of Botany, British Museum (Natural History), and examined pertinent specimens there too, I have had not only Mr. Dandy's appreciated and helpful counsel but also some firsthand information concerning the taxonomic identities of the specimens involved. In addition, conversations with Wm. T. Stearn in 1954 and more extensively in 1959, combined with Stearn's (1957) invaluable scholarly presentation of Linnaeus' methods and the procedure for choosing the types of his species, have given me some understanding of what is involved. However, I must add that neither of these men is to be blamed for either my conclusions or the means by which they were reached.

It is of fundamental importance in studies involving both biological classification as well as pure nomenclature to be well-acquainted with the organisms involved, otherwise the nomenclature may become confused due to inadequate understanding of biological relationships. It is amazing that authors who have made no detailed study of the species complexes involved in this problem can be so positive concerning the identity of the plant portrayed in a plate which does not show the necessary diagnostic characters. Some of these authors have published very positive opinions concerning the identity of a plant shown in a plate which is so vague that I am uncertain what it represents.

Stripping the problem of all pedantic trappings, there are

the following possibilities for the interpretation of *Euphorbia maculata* L. (The self-evident phrase name and italicized description are omitted both for convenience and because no one known to me has proposed to use them, and disregard the specimens and plate.)

1. The specimen in Linnaeus' herbarium labelled *Euphorbia maculata* by Linnaeus.
2. The plate of Plukenet cited by Linnaeus.
3. The specimen in Linnaeus' herbarium labelled *Euphorbia maculata* by Sir James Edward Smith.

The following table summarizes the views of the various writers on interpretation of *Euphorbia maculata* L.:

Writer	Specimen in hb. L. labelled *maculata* by L.	Plukenet plate	Specimen in hb. L. labelled *maculata* by J. E. S.
Linnaeus 1771	Limits application to this element	Probably intended to exclude	Excludes this concept.
Boissier 1862 pp. 23 & 46	Excludes	Doesn't directly mention	Indicates this is the concept.
Wheeler 1939, 1941, 1960	Takes as type	Uncertain as to identity	Excludes as anachronistic
Svenson 1945	Ignores	Takes as type (in sense of *E. supina* Raf.)	Ignores
Fosberg. 1946, 1947, 1953	Takes as type in 1946 & 1947; excludes in 1953	Identifies 1953 as same as L.'s specimen in left column	Excludes as anachronistic
Croizat 1947 & 1948	Dismisses as excluded by Boissier	Ignores	Takes as type

These items will be discussed *ad seriatim:*

1. The specimen labelled 17 *Euphorbia maculata* by Linnaeus, and still in his herbarium, is believed to have been there in 1753. This belief has, so far as I know, not been questioned. Therefore assuming this to be an accepted valid fact, let us proceed to consider the four objections which have been raised against taking the specimen labelled by Linnaeus as the basis for interpreting the species: (1) it bears the number 17 (that of *E. hypericifolia* in Sp. Pl.); (2) it does not bear number 21 (that of *E. maculata* in Sp. Pl.); (3) it disagrees with the specimen in Linnaeus' herbarium labelled 21 *E. maculata* by Sir James Edward Smith; and (4) it differs from customary usage based on Smith's interpretations.

It is obvious that an error was made by Linnaeus in either the number or the name on the sheet labelled by him (according to Savage 1945, p. 85). In this case Linnaeus subsequently (1771, p. 392) emphasized that *E. maculata* was like *E. hypericifolia,* and this is subsequent confirmation that the name *was as intended.* However, the association of 17 with *maculata* may have been more than a coincidence. It appears that *E. maculata* was extracted, perhaps late in the preparation of the treatment of *Euphorbia,* from the hodge-podge called 17. *E. hypericifolia.*

Euphorbia hypericifolia has been variously interpreted, but its various applications agree in that they are erect, relatively large (at least long) leaved plants. For a time the name was applied to the North American plant, probably on the basis of the change of name made by Sir James Edward Smith: He relabelled the specimen labelled *maculata* by Linnaeus in Linnaeus' herbarium *hypericifolia* (Savage 1945 p. 85.). Putting together the information as to who labelled what specimens with what names (Savage 1945, p. 85) with the account of Sir James Edward Smith's actions given by John Torrey (recounted below) plus my notes taken during my examination of Linnaeus' herbarium in 1954 in the light of the critical comments of Mr. Dandy (in conversation), I now understand not only what I understood in 1939, the explanation of the application of *E. macu-*

lata to the small-leaved prostrate plant called *E. supina* by Rafinesque, but now, in addition, the reason for the name *E. hypericifolia* having been applied for a time to the erect large-leaved plant of eastern North America later known as *E. nutans* Lag. or *E. preslii* Guss., and to which I have returned *E. maculata* L. in its original sense in 1939. First will be quoted the report of Torrey (1843, p. 176.):

"Many years ago, I sent specimens of this and the preceding species to Sir J. E. Smith, who assured me that the former agrees precisely with the original *E. hypericifolia* of *Herb. Linn.*, and that the latter is as certainly *E. maculata*. He also stated, that 'Linnaeus seems to have confounded his original smooth specimens of *E. hypericifolia* (numbered 17 as in *sp. pl. ed.* 1) with *E. maculata:* not that they are at all alike, nor is there any foundation for his remark in the 2nd mantissa, p. 392. The first edition of the *Sp. pl.* is here decisive authority. The original specimen of *E. maculata* is smooth, but there is a downy variety from Jamaica, from Browne's herbarium.'"

The specimen which Smith told Torrey was "original *E. hypericifolia* of *Herb. Linn.*" was the specimen labeled 17 *maculata* by Linnaeus, but relabelled *hypericifolia* by Smith according to the information given by Savage (1945, p. 85). Apparently Smith omitted to mention to Torrey the fact that Smith himself changed the name on the specimen labelled *maculata* by Linnaeus' to *hypericifolia*, nor did Smith tell that the specimen in Linnaeus' herbarium taken by Smith as the authentic specimen of *E. maculata* had been so labelled by Smith, not Linnaeus. Torrey, knowing nothing of Smith's changes, (perhaps occasioned by Linnaeus' specimen bearing the number 17), followed Smith's advice in applying both names. The specimen labelled *maculata* by Smith bore, in Linnaeus' hand, the number 21, the number of *E. maculata* in the Species Plantarum, 1753, but bore no name. Hence Smith supplied the name corresponding to the number.

The problem of typifying *E. hypericifolia* is another Pandora's box to be opened later and elsewhere. However, it is well to take this opportunity to record that my action in 1939 was probably anachronistic, for Savage (1945, p.

vi) shows that Linnaeus' specimen was acquired from Patrick Browne probably in 1758 five years after the Species Plantarum was published. N. E. Brown (1913) chose the same specimen as type!

2. The identity of Plukenet's plate (1691, tab. 65, fig. 8) is uncertain. Mr. Dandy was unable to find in 1954 when I was there at the British Museum (Natural History), any specimen on which the plate might have been based, and the plate itself is so poorly drawn and lacking in diagnostic characters and scale that any identification of it must be speculative. Nevertheless, Svenson (1945) identified it as the small-leaved prostrate plant which Wheeler (1939 & 1941) called *E. supina* Raf. Fosberg (1946) equally confidently concluded that the plate portrays the tall erect large-leaved plant long known as *E. nutans* Lag. or *E. Preslii* Guss. It may be significant that Croizat who has studied *Euphorbia* more than either Svenson or Fosberg, does not, so far as I have seen, attempt to identify the plate of Plukenet. Even though a *specimen* from which Plukenet's plate was drawn were extant, it would not have influenced Linnaeus' concept because Linnaeus, according to Mr. Dandy (in conversation in 1954), did not see Plukenet's *specimens*.

3. Of those known to me to have written on the question, only Boissier and Croizat have taken as type the specimen in Linnaeus' herbarium which was labelled *maculata* by Smith. Croizat (1947, p. 154) stated "This specimen (No. 630.11 in Savage's "Catalogue") is inscribed *21. maculata* in an handwriting which is to all appearances Linnaeus' own." Savage (1945, p. 85) indicated that this specimen was labelled *"maculata"* by Smith. Presumably Boissier, like Croizat, thought Linnaeus had labelled this specimen.

Selection of lectotypes must be on a reasonable basis; the specimen selected must agree with the description. Mere mechanical procedure in which numbers on specimens are used in preference to agreement between the specimen chosen and the description given by its author may lead to grievous error. In this case an error was made by Linnaeus (1753). He had one specimen which he labelled 17 *maculata*, and another which he labelled merely 21, but wrote no name on it. Following the system of numbering used by Linnaeus (described by Stearn 1959 pp. 11 & 12), the specimen

numbered 21 would be the type of *E. maculata* because this is the number of *E. maculata* in the Species Plantarum (Linnaeus, 1753). But in this instance Linnaeus supplied an italicized description which Stern (in conversation, Aug., 1959) assured me means that it was based on a specimen before Linnaeus. This description applies well to the specimen labelled 17 *maculata* by Linnaeus; it fails to apply to either the specimen numbered 21 but left unnamed by Linnaeus, or to the plate of Plukenet cited, as diagnostic characters given could not have been drawn from either of these two: (a) Leaves trinerved — this character is conspicuous in 17, but not evident in 21 and not shown by Plukenet; (b) leaves serrate — the toothing of the leaves is obvious in 17, but in 21 a lens is required to discern the minute serrulations, the leaves of the Plukenet plate are at most minutely and bluntly toothed; (c) cyathia (interpreted as simple flowers by Linnaeus) solitary — this fits 17, but in 21 the cyathia are congested on short branchlets in such a way that they would not have been described by Linnaeus as solitary, though they are so portrayed in the Plukenet plate; (d) "calyx" (involucre) red would characterize 17 but in 21 the cyathia are so small, crowded and obscured by vesture and reduced leaves that the involucre would not give the impression of a red calyx, the Plukenet plate being black and white could not have supplied this character.

Having seen and studied these specimens in the Linnaean Herbarium my conclusions are based on first hand observation, not on photographs or plates. However, for those who might wish to confirm these points without traveling to London, there is available the plate based on a photograph of 17 which Wheeler (1941) and Fosberg (1946) have published. In addition, the entire Linnaean Herbarium is available on microfiche published by the International Documentation Centre, Tunba, Sweden. These photographs, though small, show most of the characters discussed above.

Plukenet's plate is so poorly drawn and lacking in diagnostic characters and scale and indication of habit that it is not susceptible of identification beyond the fact that it portrays an immature plant of *Euphorbia* subgenus *Chamaesyce*, and the interpretation of this plate by some authors as representing a particular species is based on neither the

characters of the Plukenet plate, nor anything in Linnaeus Species Plantarum (1753), nor Linnaeus later elucidation of *Euphorbia maculata* in his Mantissa (1771) as being similar to *E. hypericifolia*, but on association and proximity. (According to Mr. Dandy [conversation, 1954] Linnaeus did not see Plukenet's specimens anyway, so they would not have affected his concept.)

The procedure for selection of types is prescribed in the International Code of Botanical Nomenclature (Lanjouw et al., 1956) Appendix IV. Determination of Types. The selection of lectotypes is outlined under section 4. The selection of the specimen labelled *maculata* by Linnaeus agrees with the prescribed procedure in following subsections as detailed below. (The reader can read for himself in his copy of the Code the provisions of these subsections so they will not be quoted here.) The following statement summarizing the basis for the choice of the specimen of *Euphorbia maculata* in Linnaeus' herbarium labelled *E. maculata* by Linnaeus himself will serve as a basis for judging the validity of this choice:

a. The lectotype was designated, in effect, by the original author, Linnaeus, (1771 p. 392).

b. The lectotype, or perhaps almost holotype, was so far as we have any evidence, in the possession of the original author while he prepared the work in which it was published, and the italicized description fits the specimen.

c. The lectotype designated by the original author is a specimen rather than a pre-Linnaean illustration and description.

d. Since the original author had already, in effect, selected the lectotype, later actions by subsequent authors (Smith and Boissier) are of no validity even though they established usage for a period.

e. Linnaeus, the author of the name, in effect, selected the lectotype first (1771, p. 392). — DEPARTMENT OF BIOLOGY, UNIVERSITY OF SOUTHERN CALIFORNIA, UNIVERSITY PARK, LOS ANGELES 7, CALIFORNIA.

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Calypso in New Hampshire — Though apparently seldom if ever abundant, *Calypso bulbosa* (L.) Oakes is known from various stations in Canada, central and northern Maine, northern Vermont, northern New York, and westward to the Pacific slope, commonly in calcareous swamps of *Thuja occidentalis* L. A scrutiny of the Oakes Ames Orchid Herbarium and of the Gray Herbarium sheets of this species (in which I have been assisted by Mr. Charles Schweinfurth), as well as of the herbarium of the New England Botanical

Club, has revealed no specimens from New Hampshire of this weirdly beautiful little orchid, save for a single sheet in the Club herbarium collected by me in a cedar bog in the township of Columbia on 31 May, 1946 (A.S.P. no. 31887). This sheet has, until very recently, been mislaid, but through the kindness of Mr. R. J. Eaton has now been inserted in its proper place in the Club collection.

My attention was originally directed to the Columbia locality by Mr. T. W. Wallace of Sanford, Maine, whose brother's farm in Columbia is a mile or more distant from the *Calypso*. In 1946, I saw eight or ten plants in bloom, but did not look closely for more. Several years later, on revisiting the region with a friend, I found that extensive logging of the *Thuja* had, apparently, destroyed the orchids. Since that time I have made further but unsuccessful searches in similar swamps in the calciferous mica-schist region of Columbia, Colebrook, Stewartstown, and Clarksville. In this area occur such interesting plants as *Cystopteris bulbifera, Carex diandra, C. Buxbaumii, Eleocharis nitida* (its first United States station is about a mile from the *Calypso*), *Juncus nodosus, J. brachycephalus, Lobelia Kalmii,* and *Malaxis brachypoda,* of which last the only New Hampshire specimen in the Club herbarium, A.S.P. no.10940, 13 July, 1907, was gathered about a mile away in another direction. — ARTHUR STANLEY PEASE, HARVARD UNIVERSITY.

HELLEBORINE (EPIPACTIS HELLEBORINE) IN MAINE. — In August 1959, while scouting for possible field trip areas for the approaching meeting of the Josselyn Botanical Society, I heard of a strange orchid near the hamlet of Benton Falls on the Sebasticook River. On making a trip there August 16, I was able to locate eight plants of an entirely unfamiliar orchid, which I identified as the above, the identification having been confirmed by Dr. C. D. Richards, Botany Department, University of Maine. This is the first record for Maine. The species is growing under rather widely spaced large white pines on an old pasture site, only a short distance from the end of an old mowing field. All plants were flowering profusely, one with over forty flowers. One pair of stems was browsed off (by deer). The bedrock in this area is shaly,

some a poor grade of slate. The plants are growing nearly one-half mile from the Sebasticook River and about that distance from the nearest roads, and I found no indications of an old house-site in the vicinity. — A. E. BROWER, AUGUSTA, MAINE.

Volume 62, No. 736, including pages 87-116 was issued April 26, 1960.

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